

ISSD

NEWSLETTER

Volume I Number 5

September 1988

Note From the Editor:



ften it is said that the health of a society is reflected in its newsletter. I believe that this is essentially true. This is the fifth edition of volume one, and the next edition will be the last for

1988. Throughout this year we have tried to stick to a "featured frog" format. This edition features *Dendrobates histrionicus* and *Dendrobates lehmanni*. It is coincidental that these frogs are being featured at a time when one of them is once again widely available, at least in the U.S.. This is not one of the better known species and it would seem that information about it is badly needed. I hope that the two papers presented herein will be helpful to those trying to work with these frogs for the first time.

Volume I, number 6 will be printed in November of this year. The featured frog of this edition will be *Dendrobates tinctorius*. At the present time I do not have any material for this edition.

This brings me back to the issue of the health of the society. In these first five editions we have received "major" papers from only eight different members. 1988 has so far been a very good year for the society. ISSD began as only an idea, the feasibility of which was questionable. Through extensive advertising it was determined that enough interest existed to warrant formation of the society. ISSD has now grown to a total membership of 110. It is truly an international society, with members living in Canada, the United States, England, Scotland, Switzerland, Belgium, Holland, Colombia, Guyana, West Germany, East Germany, and Czechoslovakia. (In case you

were wondering what language appears on the LoGo this time, it is Czech). We have a workable constitution, and a governing body. We have had a successful first "annual" meeting. I have received quite a bit of correspondence praising the newsletter. All in all, I am pleased with the way things are going. This is not to say that there have not been some disappointments. I would certainly like to see more member input into the newsletter. I have stated this before, and at the risk of embarrassing myself, I will stress it one more time; I need more written material to continue this publication!

I would like some feedback from the readers as to what they like and what they would like to see changed. Shall we continue the "featured frog" format or switch to a more open forum? I would like to see more dialogue on issues of common interest in these newsletters. It was hoped that the Breeders Forum column would serve as a vehicle for this, but so far there has not been much interest in it. I would like to see the merits of breeding exchanges discussed. I would like to see the issue of crossbreeding discussed; all the pros and cons. Would anyone care to comment by way of an editorial on the listing of all dendrobatids on appendix II of the CITES treaty list? Perhaps some of our readers are not well informed about CITES or the other various regulations that govern the transporting of dendrobatids within the U.S. and around the world; a good general paper on this might be very informative.

As we go into 1989, and Volume II, please give some consideration to active involvement. The health of the society depends on it!

Dendrobates lehmanni, "My Favorite Frog"

by Erik Wevers

Herein is an account of my three years experience with my favorite frog, *Dendrobates lehmanni*. This is an ideal terrarium frog; nice of colour, not timid around humans, very vocal, highly visible, but unfortunately, bred only with great difficulty.

D. lehmanni comes from the montane rain forests of Columbia, more specifically, from the Anchicaya valley. It lives at an elevation of approximately 850 - 1200 meters. The habitat is very wet; with over 6000mm annual rainfall. The temperature averages 25° C, with little seasonal variation. The habitat abounds with mosses and epiphytic plants such as bromeliads. Until a few years ago this frog was considered to be a sibling species, or a subspecies, of *Dendrobates histrionicus*. Species differentiation is now made on the basis of skin toxin analysis. Unlike *D. histrionicus*, *D. lehmanni* contains very little histrionicotoxin and relatively large quantities of pumiliotoxin.

D. lehmanni is a relatively large frog, 33 - 37mm (SVL). The colour is red, orange or yellow on a black background. The pattern is usually that of reddish bands perpendicular to the long axis of the body or limbs respectively; however there is considerable variation. The tips of the toes are usually white.

Several years ago we had a large importation of specimens of *D. lehmanni* to Europe. Most arrived in very bad condition, with worm infestations and/or pseudomonas infections. Approximately ninety-five percent died very quickly. Of those that survived the initial die off, most succumbed within a short time. The few that survived have been stable captives now for many years. The importation of this frog has now stopped and unless we are able to breed them there will be no more in Europe in a few years (the same is true for *D. histrionicus*).

These frogs prefer a large terrarium that is densely planted with bromeliads and other plants. Elevated platforms of wood for climbing should be included. A water basin, or better yet a waterfall, is very good for them. The dense planting allows for many hiding places and gives them security. The ideal temperature is about 25° C by day and 18-20° C by night. I keep my specimens

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in a terrarium 150 x 70 x 115cm (Length/depth/height). In this tank I keep one female and six males of *D. lehmanni* and also one pair of *D. silverstoni*. It is very difficult to obtain specimens of *D. lehmanni*, especially females. Most imported animals are males who, when originally collected, gave away their locations by their calls; the silent females are less often found by collectors in the jungle. This is also true of wild caught specimens of *D. histrionicus*.

I have had my frogs for about three years and have never had eggs from them. I had been keeping them in a smaller terrarium (75x55x70cm) but have recently moved them to the larger one thinking that perhaps there was no breeding because there were too many frogs, particularly too many males, in too small a confinement. There had been calling from the males in the smaller terrarium but never eggs. I hope that they will breed in this larger terrarium.

The males are very territorial, each selecting a single spot for himself and advertising his ownership of it to the other males by his calling. If one male intrudes upon the territory of another, despite the warning calls, then the two will fight. Usually it is the intruder who is driven off. Females are not aggressive towards each other, nor towards males. Several days of active courtship precede egg laying. The male calls frequently and the frogs touch each other frequently with their legs. Usually about six to fifteen very small, black eggs are deposited on a bromeliad leaf or some other leaf, or a petri dish. After about eleven days the eggs hatch out very small tadpoles (approximately 11mm). The female transports the tadpoles, each to its individual water hole. Bromeliads are chosen preferentially. The female tends the eggs and about once every other day she deposits an egg in the water, upon which the tadpole feeds. In this manner she can raise about six tadpoles up to froglets. The froglets emerge from the water after about eleven weeks; measuring approximately 17mm. At this time the froglets must feed on very small insects. Adult size is achieved in about a year. This is the only **good** way to breed *D. lehmanni* (also *D. histrionicus*). One cannot harvest the eggs from the tank as with other dendrobatid species. Tadpoles reared artificially on egg yolk do not produce healthy frogs. The successful breeder will allow *D. lehmanni* to rear its own young.

I hope that in the near future I can report to you how this method is producing good quality young frogs in my new larger terrarium.

The Red and Black Dart-Poison Frogs

by Dale Bertram, M.D.

INTRODUCTION:

Dendrobates histrionicus and *Dendrobates lehmanni*, species often linked in print, are of great interest to us. They are captivating for many reasons, not the least of which is their extraordinary beauty. The vast variety of patterns of brilliant red, orange and yellow on a background of deep lustrous black are, in a word, stunning! They are intriguing in as much as they represent the ultimate challenge to the breeder. They belong to a class of frogs often referred to as "egg feeders". Frogs which nurture their young on infertile eggs are notoriously difficult to keep and breed. These two species were long thought to be subspecies, or sister species. Their differentiation on the basis of skin toxin analysis represents an unusual application of the "high tech" tools of the modern taxonomist. In this paper we shall discuss all of these points.

DESCRIPTION:

Dendrobates histrionicus is, like so many of the dendrobatidae, an extremely variable species with respect to color phases. One would not get this impression from those specimens that become commercially available in the pet trade. These, for the most part, are limited to a few familiar patterns. *D. histrionicus* occupies a very large geographical range in the Pacific lowlands of western Colombia and northwestern Ecuador. Throughout this range various sub-populations have been identified which show relatively stable color pattern variations; however, a great deal of inter-population variability occurs.

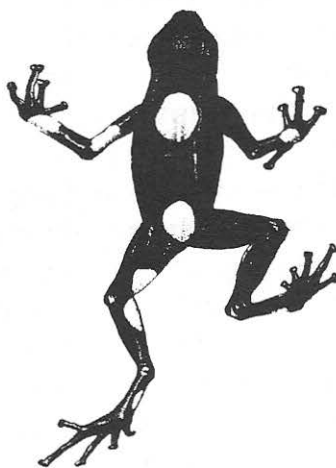
Silverstone, in his monograph: A Revision of the Poison-Arrow Frogs of the Genus *Dendrobates* Wagler (1975), listed four basic patterns and a number of sub-patterns. I will not give

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a detailed description of these herein, but rather only a brief summary; the reader is referred to the illustrations found on page 19 of the monograph. In summary, pattern 1 consists of four sub-patterns all of which are variations of irregular spots or blotches of red/orange on a background of black or dark brown. These patterns are not often seen among those specimens available through the pet trade. Pattern 2, which is nearly completely red dorsally, has never been collected commercially to my knowledge. Pattern 3, and more specifically pattern 3a, is the pattern most frequently available to the collector. This is illustrated in figure 13(H) on page 19 of Silverstone's monograph. It is black dorsally with large oval side spots that are usually fairly symmetrical. Often there are one or two irregular spots on the head and red bracelets on the limbs. The reddish orange color of these specimens is not as brilliant as that seen on the specimens of Pattern 1. From time to time these become available on the American market, usually in vast quantities, for several months at a time. Pattern 4, illustrated by Silverstone in Figure 13(O), shows a characteristic pattern of red or orange bands situated perpendicular to the long axis of the body. Typically there

is a red snout, a wide band of red just behind the eyes, and another situated somewhat further down the body. I have seen these specimens erroneously represented as *D. lehmanni*. However, the white toes that are characteristic of *D. lehmanni* are conspicuously absent.

Another pattern which is commonly available is the "bullseye" pattern. This frog is black or dark brown with a very distinctive round, or occasionally oval, spot in the middle of its back. This pattern is not represented in the Silverstone drawings which is odd in as much as it is the pattern of the holotype as illustrated by Berthold in 1846 (1847).



**Berthold's rendition of the holotype of
Dendrobates histrionicus (1846).**

Specimens of this type can be, and frequently are, collected from the upper Rio San Juan in the Department of Risaralda, Colombia. Approximately eighteen months ago this frog appeared on the American market in vast quantities and at a very reasonable price (about \$12.00 each). They were offered for approximately six weeks and have not been seen since, until just recently. About three weeks ago they suddenly became available again, and can now be found on many reptile dealers price lists.

An extensive and detailed description of color patterns from widespread population samples can be found in an interesting paper by Myers and Daly entitled: Preliminary Evaluation of Skin Toxins and Vocalizations in Taxonomic and Evolutionary Studies of Poison-Dart Frogs (Dendrobatidae); Bulletin of the American Museum of Natural History, Volume 157 : Article 3, 1976. These descriptions are from population samples made by the authors with the stated objective of obtaining a sampling that is "sufficient to reveal the general nature of this frog". The descriptions are illustrated with fine photographs. It would not serve the purpose of this paper to reiterate these descriptions here and therefore the interested reader is referred to the

original paper.

There are significant differences in size between different populations of this species. Over its entire range the mean SVL is approximately 25-38 mm. A population of relatively smaller frogs is isolated along the upper Rio San Juan. Along most of the river there is little size variation despite significant variability in color patterns. South of the river there is a progressive tendency toward smaller body size as cooler, drier climes are sampled. On the average, males tend to be somewhat larger than females. However, this is only a statistical fact and to a collector attempting to sex any individual specimen, it is relatively meaningless. There is no external sexual dimorphism, other than vocal slits present in the male. Proof of male sex in a living frog depends upon observation of the characteristic aggressive interplay between males and/or vocalization. Population samples, including those made for commercial exploitation in the pet trade, usually contain a disproportionate number of males and in fact it may be difficult to obtain females from any one particular commercial offering.

Dendrobates lehmanni is rarely offered for sale! The would-be buyer would do well to question the seller

carefully to determine if *D. lehmanni* is truly the species being offered in as much as this species is frequently confused with *D. histrionicus*. *D. lehmanni* was named as a distinct species by Myers in the aforementioned paper. The type specimen was collected by Myers and Daly in January of 1973 in montane forest, approximately 13 km. west of the town of Dagua at 850-1200 meters elevation on south-facing versant of upper Rio Anchicaya drainage in the Department of Valle, Colombia. *D. lehmanni* is known only from the type locality. It is a relatively large dendrobatid, averaging approximately 35 mm SVL. It is characterized by a pattern of two vivid orange or reddish orange crossbands on a background of deep brownish black or black. Typically these crossbands are located at the base of the neck and at the sacral region and are aligned perpendicular to the long axis of the body. There are similarly colored bracelets on all four limbs, two on the rear legs (one above and one below the knee) and one on the front legs (usually at the elbow). Often there is a blotch of red/orange on the dorsum of each of the rear feet. There is a distinctive white coloration on the dorsum of all the toes. Frequently there is a red spot on the nose.

HUSBANDRY AND BREEDING:

Obtaining healthy specimens that live long enough to breed is the paramount obstacle confronting the collector. These species are notorious for a high post-shipping mortality rate. It is always a grievous disappointment to buy frogs only to see most of them die within the first week after arrival. This is the rule rather than the exception with these two species. If mail or airfreight shipping can be avoided, it should be. It has been my experience on numerous occasions to have frogs arrive looking healthy and eating well; but after a few days they cease feeding and die overnight. Why this happens is a mystery to me, but it is an all too familiar story. Approximately eighteen months ago I bought twelve specimens of the "bullseye" color pattern of *D. histrionicus*. As is usually the case, the initial mortality rate was high. At the present time only two of the original twelve remain alive, both females. One of the two females has become quite large and plump and about four months ago began laying occasional clutches of very small, healthy looking, infertile eggs. There was no particular pattern to this

laying. I would simply find some eggs occasionally. Of course, without a male to fertilize the eggs, no tadpoles ever developed. I attempted to obtain a male through a breeding loan but until recently have been unsuccessful. It is difficult to ask people to risk a breeding loan knowing that the shipping of a frog may, and in fact probably will, result in the eventual death of the loaned frog. Although I was unable to find another "bullseye", I did manage to obtain an exceptionally beautiful male from Jack Frenkle. This specimen is quite large and robust, with a pattern of large irregularly situated brilliant reddish orange blotches on a black background. Initially this frog was quite vocal and courtship behavior was seen almost immediately. The first clutch of eggs after the introduction of the male was infertile. The second clutch of eggs (totaling eight) had two which began to develop. Those two eggs developed to the point where a head and tail could be clearly delineated, but then died. The infertile eggs had been separated from those that showed early development. Subsequent to this, a few more clutches of eggs were produced but all were infertile. Egg deposition by the female and vocalization by the male, as well as courtship behavior, has

since stopped. I attribute this to the prolonged high temperatures that have prevailed in my frog room during this excessively hot summer. Two days ago I received a fine male specimen of "bullseye" *histrionicus* from a friend in Hawaii. If the frog survives the quarantine period it will be introduced into a new larger terrarium simultaneously with the others.

Dendrobates histrionicus and *Dendrobates lehmanni* are very active frogs, males of which show considerable territorial aggressiveness. This fact must be taken into account when designing an enclosure to house them. They should be kept in as large a terrarium as possible, with population density kept to a minimum. If more than one male is to be kept in the same terrarium, there must be sufficient space for each of them to stake out an individual territory. One means of achieving maximum space utilization is to have several elevated platforms at various heights around the tank. They are good climbers and will enjoy this variety. They are fond of sitting on the leaves of large plants, particularly at night. They will seek out the highest possible roost. A water dish or shallow stream of running water should be provided. There should be plenty of

hiding places and dense plantings. If the environment is adequate to insure a sense of security, the terrarium's occupants will be quite bold and active. Ritualized fights between males rarely result in any physical harm to either opponent, and if they occur only infrequently, should not be discouraged. If there is inadequate space for the number of males present, one male may so dominate and intimidate another that the weaker one will cease feeding. Careful observation of the interactions of the frogs should allow one to decide if separation of the males is necessary. Females do not show any aggressiveness toward one another, nor toward the males.

These animals require a warm and moist environment. Daytime temperatures should average 78 - 84° F with slightly lower temperatures at night. Terrariums should be misted heavily at least once per day. Fruit flies and vitamin dusted crickets will suffice as food, although supplementation with other small insects occasionally is beneficial.

The males vocalize incessantly. I have not noticed any difference between mating calls and other vocalizations that do not seem to be courtship related. The females are silent. Courtship is elaborate,

involving several days of close interaction between the mating frogs. The male pursues the female, and visa versa; the two circle each other and there is frequent stroking with the limbs. No amplexus occurs, fertilization occurring as the male and female are situated vent to vent. After the clutch is laid there is remarkable parental involvement in the care and nurturing of the young. The female attends the eggs, washing them and rearranging them often. When the tadpoles hatch, each is transported individually to an isolated water reservoir. The female has the ability to remember where each tadpole has been deposited and returns to the site at least every other day. The tadpoles are fed by the mother who deposits an infertile egg into the water approximately every other day; They become agitated as the female frog lowers her vent to the water and deposits the food egg. Attempts have been made to artificially rear tadpoles on various diets. They will starve to death rather than eat the usual food items taken eagerly by other dendrobatid tadpoles. The first successful breeding of *D. histrionicus* on an artificial diet was recorded by Helmut and Elke Zimmermann. Tadpoles were fed on a diet of chicken egg yolk. To my knowledge, no one reports any

unusual successes with these species and they are still regarded by all as being quite difficult to breed. Anyone who wishes to breed these challenging animals should enter into the venture with the attitude that they probably will never be able to recover their financial investment. This however, should not be a deterrent to the serious breeder.

SKIN TOXIN ANALYSIS:

No discussion of *Dendrobates histrionicus* and *Dendrobates lehmanni* would be complete without a discussion of skin toxins and their taxonomic significance. Using standard morphological taxonomic characteristics it is difficult to convince oneself that these two species are distinct from each other. The use of non-morphological characteristics in taxonomy is by no means new. Its value, relative to morphological systematics, is limited by lack of data. Often detailed biochemical or other types of studies are needed on a host of species before enough information is obtained to make comparative assessments. The applications of this discipline are limited to refinements of morphological classifications where

dispute can only be resolved by this additional step. Such was the situation which led to the differentiation of *D. histrionicus* from *D. lehmanni*.

To the average collector, the fact that these animals are toxic is only of novel interest. There is a certain mystique associated with the "poison-arrow" frogs (more properly - Dart-Poison Frogs). However, it does not seem that people are attracted to them in the same way that some amateur herpetologists are fascinated with poisonous snakes. *D. histrionicus* and *D. lehmanni* are not Dart-Poison Frogs in the true sense of the phrase. They have never been used for poisoning blow gun darts and they do not possess the tremendously toxic batrachotoxins that the true Dart-Poison Frogs (such as *Phyllobates terribilis*) do. The skin toxins of *D. histrionicus*, histrionicotoxins, differ from batrachotoxins in that they are not steroidal, although they are alkaloids. They are bicyclic "spiro-alkaloids", and are significantly less toxic than the batrachotoxins. These compounds are unique in nature. No other organism is known to possess a toxin characterized by this spiro-piperidine ring system. By the use of sophisticated biochemical analysis techniques, the characteristics of the

skin toxins of *D. histrionicus* have been worked out in great detail. Similarly the pumiliotoxins, first isolated from *D. pumilio*, have undergone considerable investigation. Pumiliotoxins contain a non-steroidal bicyclic ring system. They are more toxic than the histrionicotoxins but less so than the batrachotoxins. Myers and Daly investigated these toxins, utilizing large samples of skins from *D. pumilio*, *D. histrionicus* and *P. aurotaenia*. These studies had as their purpose, among other things, the gathering of molecular data to be used for taxonomic studies. In these studies Myers and Daly made an important assumption, namely that "identical alkaloids in different species owe their existence to a common evolutionary event". Apparently from their application of this assumption to the case of *D. histrionicus* and *D. lehmanni*, it would appear that they believe the converse to be true also.

Analysis of the data obtained from the skin toxin profiles of the samples of the various populations of *D. histrionicus* made by Myers and Daly is quite complex. Suffice it to say that throughout its range there are qualitative similarities that lend support to a coherent species definition despite the great differences in color patterns, size variation, and

behavioral adaptations. Application of the same analytical methods to specimens of *D. lehmanni* revealed a remarkable dissimilarity with *D. histrionicus*. *Dendrobates lehmanni* shows an entirely different skin toxin profile; notably, histrionicotoxins are lacking as the major alkaloids. The major skin alkaloids of *D. lehmanni* are pumiliotoxins. To quote Myers and Daly: "*Dendrobates lehmanni*, therefore, is biochemically distinct. It elaborates pumiliotoxins and other high and low molecular weight alkaloids that appear not to occur in *D. histrionicus*, which has a different spectrum of compounds". Despite these conclusions Myers and Daly still apply the term "sibling species" to *D. lehmanni*.

I have been arbitrarily brief in my discussion of the subject of skin toxins, this reflects my personal bias only. What is apparent from reviewing the literature is that this is a subject with far reaching implications to the taxonomist. For my part, I am content to regard both *D. histrionicus* and *D. lehmanni* for their extraordinary beauty and the interesting husbandry problems they present.

CONCLUSION:

Dendrobates histrionicus and its "sibling species" *Dendrobates lehmanni* are extraordinary frogs in many respects. They occur in seemingly infinite varieties, all of which share one common trait, stunning beauty! Although difficult to obtain and to keep in captivity, they are well worth the effort to do so. They display highly unusual reproductive habits and they present a significant challenge to the most serious breeder. They hold great interest to all who study them, from the most novice collector to the most sophisticated biochemist - an extraordinary animal indeed!

An Editorial:

(Peruvian Expedition Thwarted)

Several **ISSD** members, myself included, have been planning an expedition to Peru. The planning of the expedition, as well as the collection permit application process, has been slowly progressing over the last ten months. As originally planned the expedition was to have begun with the forming of the company in Iquitos,

outfitting there, and then travel by air to Yuramaguas. From Yuramaguas we planned to travel by river down the Rio Huallaga to the Rio Marion all the way back to Iquitos. A side trip, of several days, up the Rio Nanay to the village of Mishana was to have been included. The purpose of the expedition was to make an extensive collection of specimens of species of the *quinquevittatus* complex.

Of greatest interest is *Dendrobates fantasticus*, which is represented in American collections by only a very few specimens. This frog is known only from the Huallaga Valley. There is great concern that the rapid deforestation, for coca plantations, in the Huallaga Valley, may threaten the *fantasticus* population. The captive gene pool of this species is, in my estimate, totally inadequate to ensure the survival of the species if the wild population should become extinct! Often we hear of heroic efforts by a few concerned individuals or institutions to preserve the last few remaining specimens of some animal thought to be becoming extinct in the wild. While these efforts are always commendable, often they become popular only when it is almost too late; better to build up a stable, healthy, and reproducing, captive population before it becomes evident that the

wild population is in serious trouble!

There is little doubt that extensive coca farming is having, and will continue to have, a deleterious effect on the native habitat in Amazonian Peru. Of even greater concern is the prospect of even more, and perhaps total, habitat destruction by aerial application of defoliants to the coca fields and surrounding jungle. Currently the U.S. State Department is working on a plan to use a defoliant called Spike (Eli Lilly & Company) in the Huallaga Valley.

The "drug problem" is a very serious one. Coca production is such a lucrative endeavor that it can hardly be resisted by those who see it as a way out of the cycle of poverty they endure. With billions of dollars at stake, is it any wonder that environmental concerns are put aside? Trafficking in cocaine is of course illegal, not only in the U.S., but in Peru as well. The criminal activity that it spawns is of great concern to us in the U.S., but we are not the only ones affected. Peru is a country that is relatively unstable politically. There are those who are keen to manipulate the drug industry in an effort to extend their political influence. One such group is the Shinning Path, a fanatical Maoist guerrilla group. In recent years this group has slowly emerged as a

major political force mainly by forming an alliance with local drug lords. In some areas the guerrillas have become the active military force of these criminals. It is rumored that The Shinning Path espouses a political philosophy not unlike that of the notorious Khmer Rouge of Cambodia. They have gained considerable influence in the Huallaga Valley by exploiting the locally unpopular manual coca eradication program of the Peruvian government's special anti-narcotics police force. In the last three years thirty four coca eradication team members have been murdered. Also recently there have been several reported murders of Americans in the Huallaga Valley, much of which is now controlled totally by the Shinning Path guerrillas. These have been roadside execution style murders that appear to have been unprovoked and involved people who were not connected with the anti-narcotics effort. It is thought that the Shinning Path is simply attempting to demonstrate bravado as it consolidates its power. It is known that their hatred of Americans is particularly virulent. This unholy alliance between the radical guerrillas and the drug lords has become so politically explosive that it may in fact have been the driving force behind Peruvian President Garcia's

decision to allow the U.S. to begin testing herbicide in the upper Huallaga Valley last October.

In consideration of the above developments, it would be imprudent, to say the least, not to cancel our expedition. As much as we are concerned about collecting specimens from this dying valley before it is totally devastated, the risks are just too great.

Last year a friend of mine, who recently has become an **ISSD** member, made collection of two variants of *fantasticus*, as well as some specimens of *quinquevittatus* and *imitator* from the Huallaga Valley. He recently reported to me that the *fantasticus* have begun to reproduce. Hopefully he will be successful in building up a good colony. I would like to encourage all members who keep *fantasticus* and other species of the *quinquevittatus* complex to be especially diligent in the maintenance of this small captive gene pool. We should attempt to organize a network of breeders of these species so that we can exchange specimens rather than back-breed to the point of genetic deterioration. In the last edition of this newsletter, I called on breeders of these species to register their stock with **ISSD**. To date I have received no reports. I hope that our members will

take this challenge seriously. Here we have an opportunity to use the organizational network that **ISSD** provides to do something which might not otherwise be possible. This was one of the purposes for which **ISSD** was established. Send us reports of your work with these species, please! The information will be kept strictly confidential, and it will not be printed in the newsletter or any other public forum. It will be used only to facilitate cooperative endeavors between breeders for those purposes stated above.

Respectfully submitted:

Dale Bertram - Newsletter Editor

The "Breeders Forum"

Mr. Bob Davies of Wigan, England has written to the editor with some comments on the questions raised in Volume I, number 3. He replies to Chris Palmer's question concerning the heating of terrariums with: "I use thermostatically controlled spotlights beamed down through the glass section of the

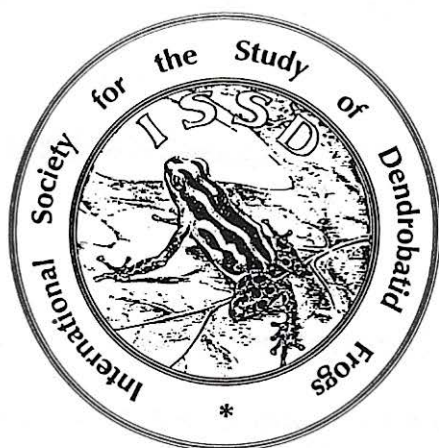
vivarium lid. The vivarium is housed in a cabinet. I feel that this is rather wasteful and I am considering trying sub-soil heating cables. Have any other members views on this?"

Mr. Davies also raises the following issue: "I would like, via the "Breeder's Forum" to read of other members views on the necessity or lack thereof of lights with a UV content. I have bred and reared F₁ and F₂ *D. auratus* without UV tubes. However, some froglets on one or two occasions have developed weak limbs, curved spines, and trembling fits followed by death."

Classified Ads:

FOR SALE: *Dendrobates auratus* (Hawaiian), captive bred babies of the F₁ generation. \$15.00 each plus \$15.00 for express mail postage. Guaranteed to arrive alive and stay that way; Buyer determines what is a fair time frame for guarantee (guarantee applies to individual collectors or Zoos only). Call Dale Bertram at 608-233-1083.

FOR SALE: *Phyllobates vittatus*, captive bred. \$50.00 each to **ISSD** members only. *Dendrobates auratus*, captive bred (Costa Rica); \$35.00 each to **ISSD** members only. All shipments are FOB Miami international Airport. Live arrival guaranteed on Air Freight shipments only, no guarantee on Express Mail shipments. There is a \$10.00 packing charge on all orders under \$300.00 US. Please contact: Andrew Briskin at (305) 270-0419, Monday through Saturday, 10-8 EST. You must mention that you are an **ISSD** member to take advantage of the above prices which are generally 35% less than our normal prices.



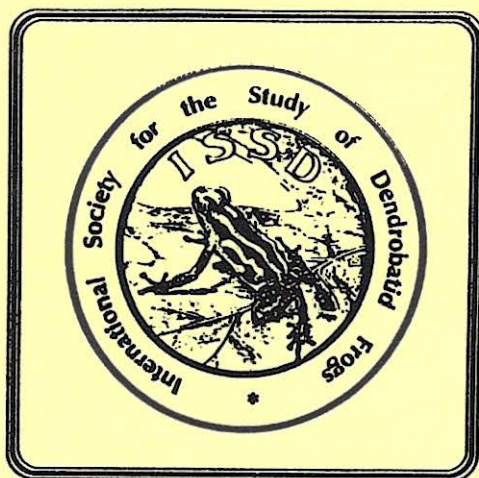
International Society for the Study of Dendrobatid Frogs

I S S D

A general statement of some of the goals and objectives of ISSD:

ISSD exists to:

- : To encourage, stimulate, and wherever possible, facilitate scientific research as it relates to any and all aspects of the study of Dendrobatid frogs; including, but not limited to, ecological studies, toxicological studies, taxonomic studies, and studies concerned with husbandry and captive propagation.
- : To unify those individuals who participate in these studies and to provide vehicles of communication for the dissemination of knowledge gained as a result of this research.
- : To afford those individuals who participate in programs of captive propagation the opportunity to develop a breeders network to facilitate breeding loans and species trades.
- : To assist those individuals who need, or desire, to communicate with foreign government agencies which control access to wild populations of Dendrobatids in countries where they exist naturally.
- : To encourage uniformity in record keeping systems for captive propagation programs, as well as uniformity in methods of wild captured specimen disposition reporting.
- : To encourage preservation of, and protection for, populations of threatened or endangered Dendrobatid species; while at the same time preserving opportunities for limited access to those populations by individuals with legitimate research interests.
- : To encourage the establishment and maintenance of stable and genetically diverse captive populations of endangered or threatened species.



ISSD extends an invitation of membership to any and all persons who are interested in the study of Dendrobatid frogs.

Membership Registration:

Name: _____

Address: _____

Phone #: _____

Date: _____

Comments: _____

Annual membership dues are \$15.00 (U.S. funds). New members may submit dues using one of the following methods: A. \$15.00 cash, U.S. currency (please send via registered mail and wrap a piece of paper around the bills so that they are not visible through the envelope). B. Send a draft from a U.S. bank made out to ISSD in the amount of \$15.00. C. Send a draft from a non-U.S. bank or an international money order made out in the currency of your respective country in an amount which, when exchanged, will be equivalent to \$18.00 (U.S. funds). Please do not send non-U.S. bank drafts or international money orders made out in U.S. dollars, significant delays and excessive fees are charged to process such drafts.

Send registration forms and dues to:

ISSD - c/o Ed Tunstall
2320 West Palomino Drive
Chandler, Arizona
85224 U.S.A.